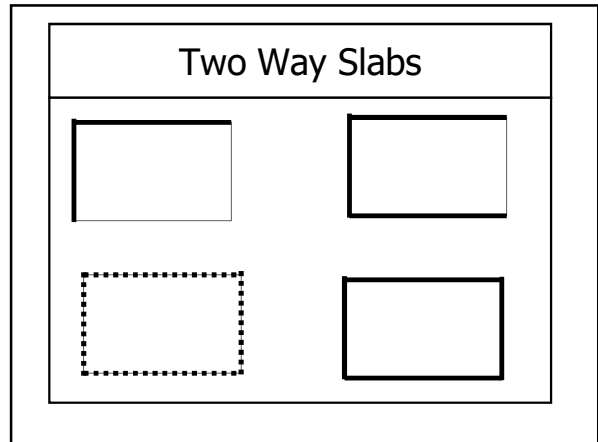
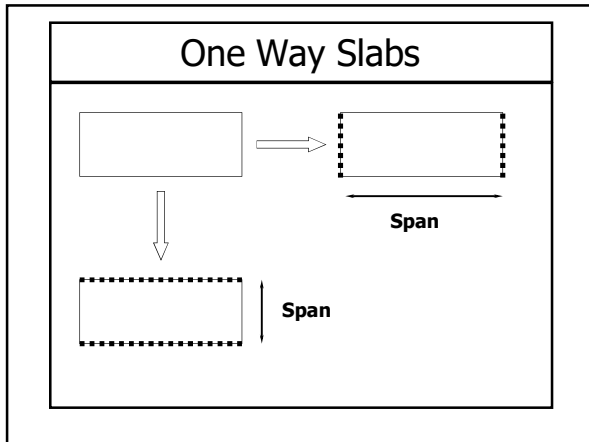
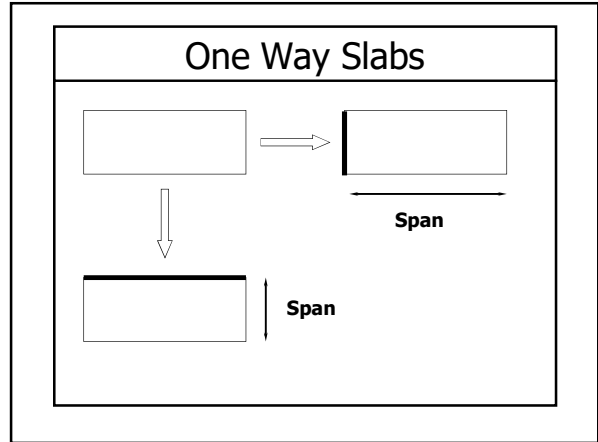


DESIGN OF 2/WAY SLABS
Dr.Irfan-ul-Hassan



Load Distribution in 2-Way Systems

$P = P_1 + P_2$
 $P_1 L_1^4 = P_2 L_2^4$
 $P_1 / P_2 = L_2^4 / L_1^4$

The diagram shows a square slab with a central point load P. The slab is divided into four quadrants by a horizontal and a vertical line. The horizontal length is labeled L₂ and the vertical height is labeled L₁. A small circle with a cross inside is at the center, representing the load. Dashed lines indicate the boundaries of the slab.

When Two-Way System may be Designed as One-Way

L_2/L_1	P_1/P_2	P_1	P_2
1	1	1/2 P	1/2 P
1.5	81/16	81/97 P	16/97 P
1.8	21/2	21/23 P	2/23 P
2	16	16/17 P	1/17 P
2.5	39	39/40 P	1/40 P

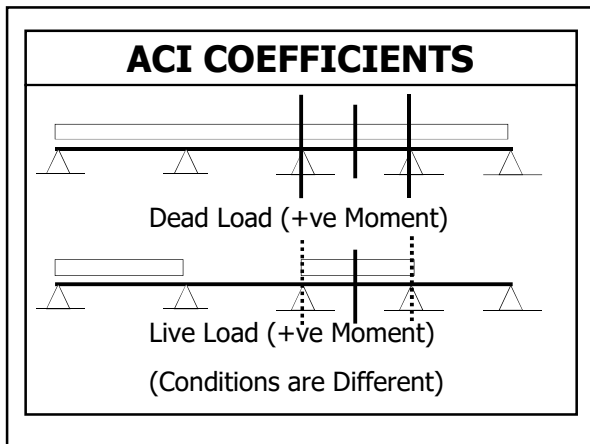
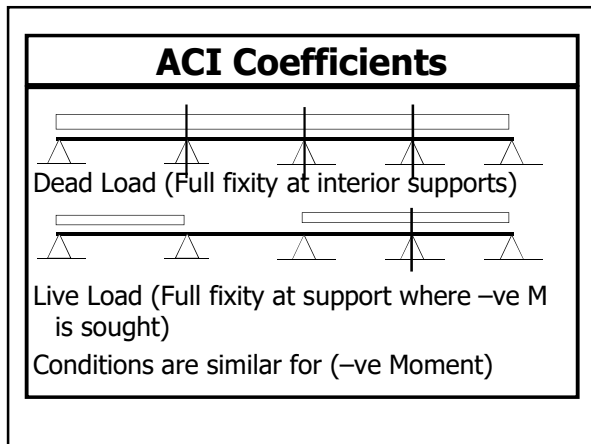
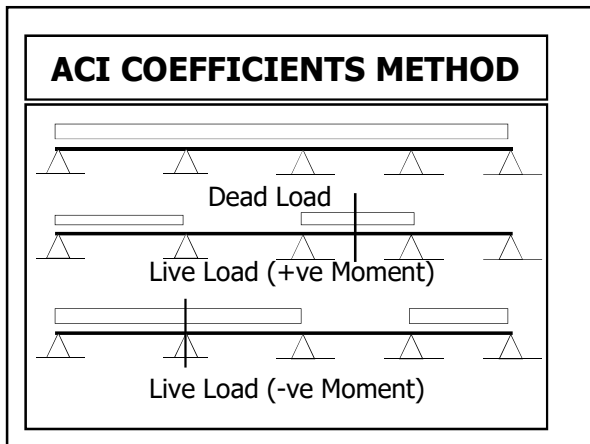
ANALYSIS of 2-WAY SYSTEMS

Governing Equation

$$\frac{\partial^2 M_x}{\partial x^2} + 2 \frac{\partial^2 M_{xy}}{\partial x \partial y} + \frac{\partial^2 M_y}{\partial y^2} = W$$

Analysis may be proceeded by Finite Element Method or Finite Difference Method

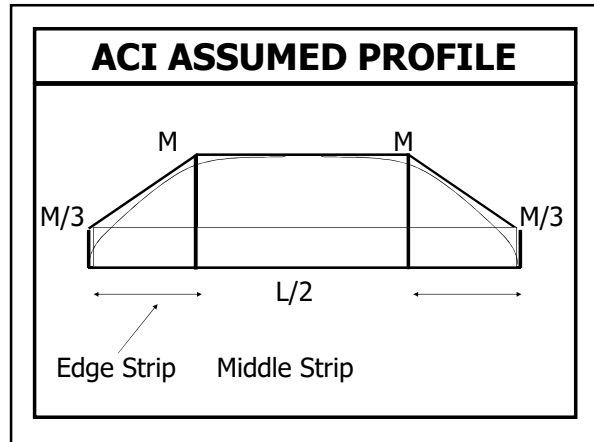
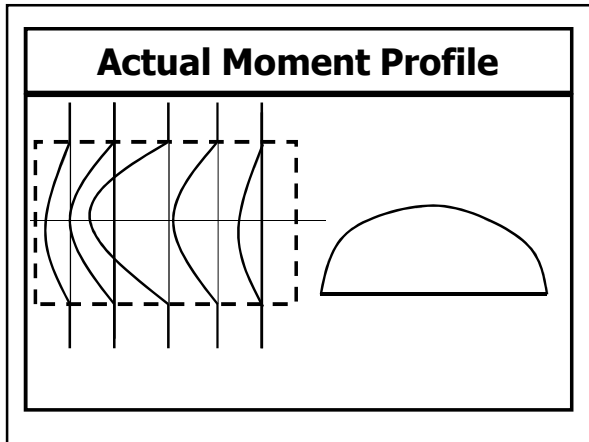
- Approximate Methods**
- ACI Direct Design Method
 - ACI Equivalent Frame Method
 - Strip Method
 - Yield Line Theory
 - ACI Coefficients Method ←



ACI COEFFICIENTS

There is one set for coefficients for negative moments (Dead or Live) at supports. (derived with full fixity at continuous supports)

There are two different sets of positive moments coefficients separately for Dead and Live Loads (full fixity for dead load and partial fixity for live loads)



Maximum Spacing

Maximum spacing should not exceed:

- 2 x thickness of slab at critical sections
- 5 x thickness of slab elsewhere
- 18" (450 mm)

Edge Strip

Edge Strip Moment = $\frac{2}{3} M_{max}$

Edge Strip Steel = $\frac{2}{3}$ Middle Strip Steel

s (edge) = 1.5 s (middle)
But not in violation of s_{max}

